

USE OF FREE AND OPEN SOURCE SOFTWARE IN DEVELOPMENT OF WEB BASED TOURISM MANAGEMENT SYSTEM: A CASE STUDY OF GOPALPUR, ODISHA, INDIA

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ABSTRACT

Tourism industries need a robust information dissemination system for the tourists worldwide. Information technology powered with Web GIS, internet, mobile technology, etc is now emerged as the most powerful tool for the tourism authorities/Board/Corporations in attracting tourists to tourist sites/scenic spots. Web GIS portals developed through free and open source softwares(FOSS) have become cheap and time saving process in generation of Tourism Management Systems or Tourism Information System. In this paper an application is developed for tourism management using FOSS. The spatial information of each parcel of the Gopalpur tourist site, all infrastructures relating to tourism, openly available satellite images along with base maps, dynamic weather information, etc are highlights of the developed portal. The complex shortest route finder developed with OSRM routing machine & Java scripts is also a part of the portal.

KEYWORDS: *Tourism, Free & Open Source Software, Web GIS, HTML, CSS & Java Scripts*

Received: May 30, 2019; **Accepted:** Jun 18, 2019; **Published:** Jul 04, 2019; **Paper Id.:** IJEEFUSAUG20196

INTRODUCTION

Tourism is identified as one of the third industries of the future world (Bill Gates of Microsoft). India has already been a must visit destination for tourists around the world. India welcomed over 8.03 Million foreign tourists in 2015, and the number crossed to 8.80 million in 2016 (GOI, 2018). The tourism industry in India generated 220 billion USD in 2016, which amounted to 9.6 percent of the nation's GDP (WTTC, 2017). The industry supports over 8% of the country's employment (WTTC, 2017). India has climbed from rank *7 in 2017 to rank *3 in 2018 in the World Travel & Tourism Council's power and performance index. Tourism authorities/Boards/Corporation once a forgotten resource, are now using the power of information technology to persuade people to visit them. The use of Web GIS and mobile application social media modulated through internet in sharing information on beauty, potential and facilities has revolutionized the tourism industry around the world.

GIS perform as a tool to analyze both spatial attribute data, and assist in building Decision Support System for organizations. The technology has been reshaping tourism governance with its multi dimensional applications. GIS not only provides information on tourism attraction but it is a database of geographical conditions, transportation accommodation, policing, health services facilities etc. Web GIS is the process of

designing implementing, generating and delivering maps on the World Wide Web (www) by combining both the advantages of GIS and Internet. GIS integrates and relates data with spatial component, and facilitates users to view in proper format which support in making complex spatial decision through visualization, interactive modeling and analysis environment. A web GIS is a GIS application made available through a common web browser.

Today, web GIS and mobile applications are eliminating the challenges of data dissemination/sharing and updating with digital workflow that increase efficiency and data quality. Now, with the use of free and open source softwares, we can configure commercial off-the shelf applications and use of smart device (Christa Campbell 2018). Through this paper, an attempt has been made to showcase the efficiency of free and open source softwares in developing a web based tourism management system for Gopalpur on sea of Odisha state, India.

Study Area

Gopalpur sea i.e. Gopalpur Notified Area Council (NAC), 16 kms away from Berhampur, consists of 06 revenue villages with a spatial extent of 312 hectre. From an obscure litter fishing village, Gopalpur became a predominant trading port during the days of the British East-India company. Govt. of Odisha has recently renovated this spending to nearly Rupees. 2000 crores.

Gopalpur on sea, seems to be the most attractive spot for both international and national tourists. It offers its visitors slices of serenity in environ that are conducive to introspection and conviviality. Gopalpur sea is a surface delight and excellent for sailing. A study conducted by Directorate of town planning of Govt of Odisha reveals that out of the total tourists visiting Gopalpur on sea on a particular day, nearly 40% belong to international category. The spatial extent of Gopalpur on sea i.e. Gopalpur NAC, lies within $19^{\circ} 14' 49''$ N to $19^{\circ} 16' 21''$ N latitudes and $84^{\circ} 53' 39''$ E to $84^{\circ} 55' 08''$ E longitudes.

METHODOLOGY

In this study, some client side and server side programme languages like Java scripts, HTML, CSS etc. have been used to execute a geo spatial portal for tourist management system. The website is first built using HTML,CSS and Java scripts with integration of spatial data to build a geo-spatial portal. For shortest route analysis, OSRM Routing machine is used. Base map layers are taken from google and open street maps. GIS data are prepared in Quantum-GIS and programming languages are written in Notepad ++. All the assets/infrastructures/amenities have been crowd sourced through GPS based geotagging method, and a cadastral (plot) level land use of the study area has been generated through interpretation of high resolution satellite images freely available through Google Earth.

Server Side Scripting Languages

Server-side scripting is a method of designing websites, so that the process of user request is run on the originating server. Server-side scripts provide an interface to the user and are used to limit access to proprietary data, and help in keeping control of the script source code. For this study, java scripts are used as a server side scripting language.

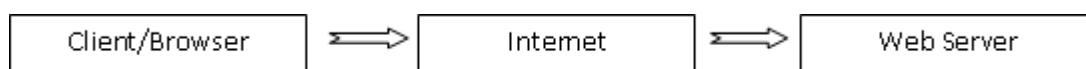


Figure 1

When a client requests for a web page, that information is processed by the web server. If the request is a server side script, before the information is returned to the client, the script is executed and the result of the script is returned to the client.

Client Side Scripting Language

All websites run on three components: **the server, the database, and the client**. The client simply uses the browser to view a web site, and it is where client side technology is unpacked and processed. The server can be at any remote location anywhere in the world housing data, running a site's back end architecture, processing requests and sending pages to the browser. The client anywhere viewing the website can use mobile devices, laptops or desktop computers. Server side scripting is executed by a web server; client side scripting is executed by a browser.

Client end scripts are embedded in the present website's HTML, markup code, which is housed on the server in a language that's compatible with, or compiled to communicate with the browser.

OSRM Routing Machine

The Open Source Routing Machine or OSRM is a C++ implementation of a high performance routing engine for shortest paths in road networks. Licensed under the permissive 2-clause BSD license, OSRM is a free network service. OSRM supports Linux, Free BSD, Windows, and Mac OS X platform.

It combines sophisticated routing algorithms with the open and free road network data of the Open Street Map (OSM) project. Shortest path computation on a continental sized network can take up to several seconds, if it is done without a so called speed up technique. OSRM uses an implementation of Contraction Hierarchies are able to compute and output a shortest path between any origin and destination within a few milliseconds, whereby the pure route computation takes much less time. Most effort is spent in annotating the route and transmitting the geometry over the network.

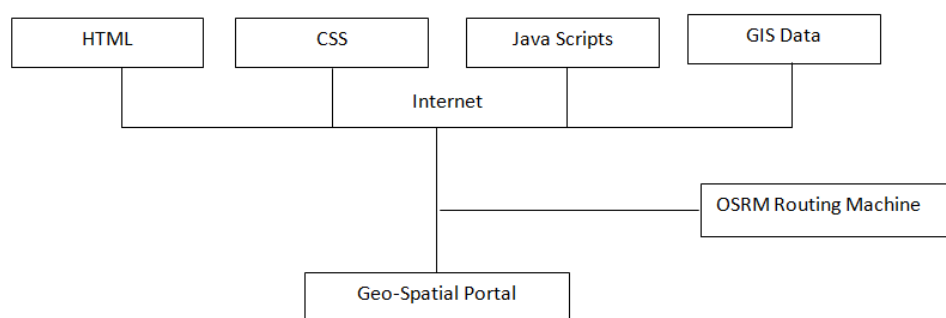


Figure 2: Flow Chart of the Methodology

RESULTS AND DISCUSSIONS

For creation of web GIS based Tourism Management System, Programming Scripts like HTML (Hyper Text Markup Language), CSS (Cascading Style Sheet) and Java Scripts have been used in this paper. The geo-portal has been hosted in cloud for testing. Only coding have been used to achieve the goal, because this method is open source and economic. The important feature of the geo-portal is the spatial layers of assets/infrastructures of the study area. The assets/infrastructures those geo-tagged in the portal include all Banks, ATMs, temples, police stations, hotels, hospitals, church, cyclone shelter, petrol pump, post office, all tourist spots, all govt. vacant lands, cinema hall, wayside & public

amenities etc. This has been termed as asset layer which is further linked with road, land layer and can be visualized and queried by any user (tourist in this case) in the portal.

Home Page

The home page (<http://localhost/tourismmangamentsystem/index.html>) of the developed Web GIS portal provides links to all the pages and information. It is developed with HTML, HTML5, CSS and Java Scripts. Upper side of the home page contains a tool bar. This tool bar also includes map view, live weather, about us and contact details. Photo gallery of Gopalpur on sea is designed in the middle. User can also have the access to web map at cadastral (plot level land use and infrastructures relating to tourism management), live weather of Gopalpur and Emergency contacts through the three links provided in home page.

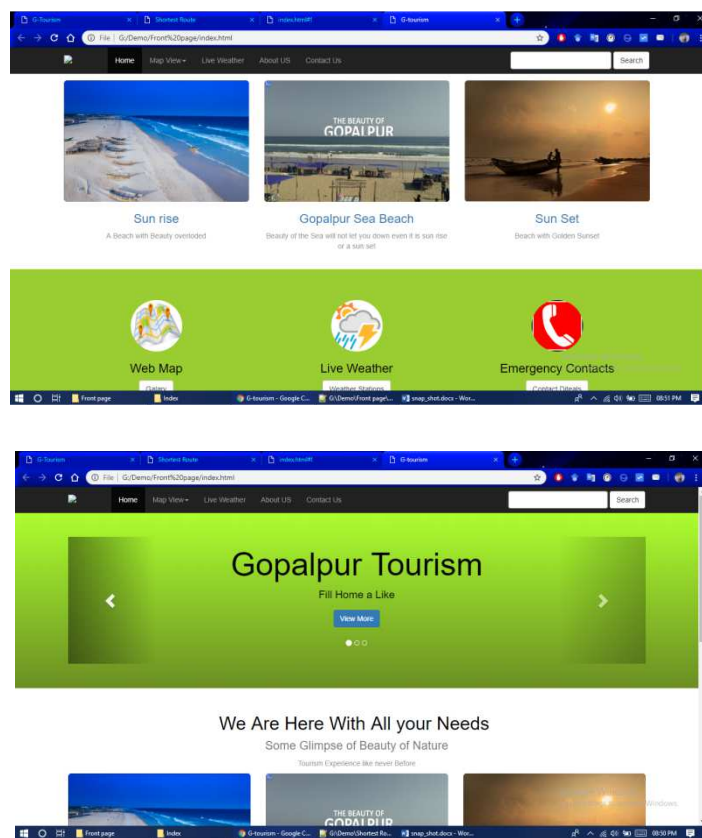


Figure 3: Home Page of the Portal

Web Map

The web Page is also created with HTML, CSS and Java Scripts. This contains base maps form Google Satellite Image, Google Map and Open Street Map. Any tourist, visiting or intending to visit Gopalpur on sea can toggle to choose any one or multiple base layers in this page as the user. Four more custom layers are embedded in this page of the portal for the users i.e.; (i) Administrative Boundary of Gopalpur NAC with ward Boundaries, (ii)land use and land cover at plot level (iii) all roads extracted from Google Earth high resolution satellite images and (iv)all assets relating to tourism management. The user can geo-locate him and can perform queries in asset layers providing window about the clicked features. All the basic functions like zoom in, zoom out, mouse pointer location in degree decimal etc. are also in the web map.

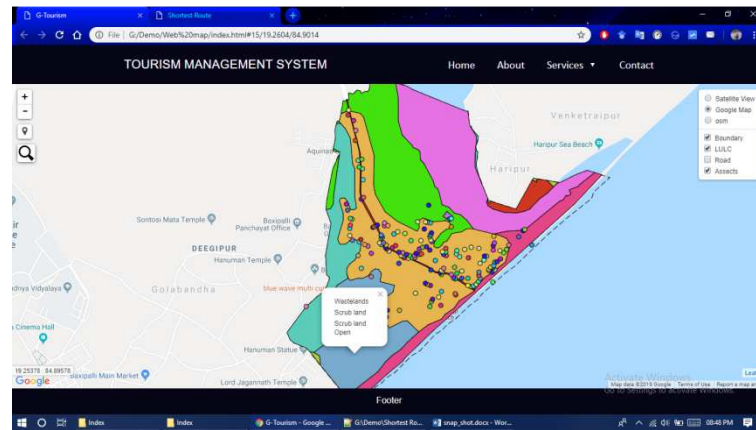


Figure 2: Web Map

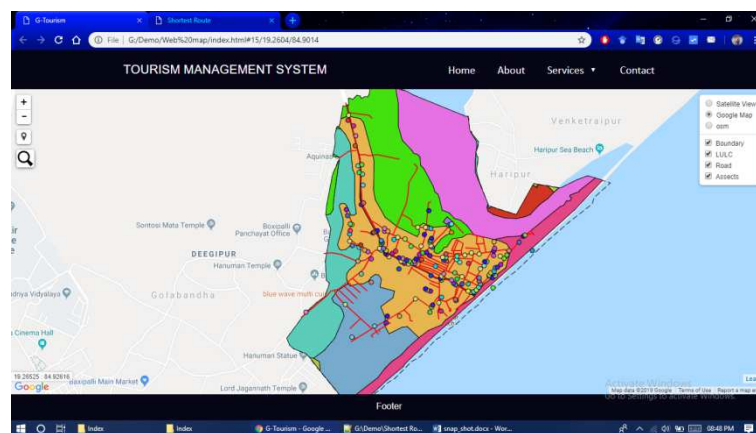


Figure 3: Web Map

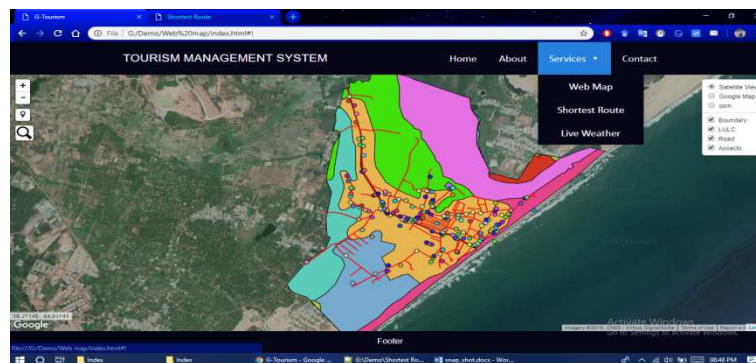


Figure 4: Web Map

Shortest Route Finder

This complex operation has been developed with OSRM Routing Machine and Java Scripts. This page allows one user to find shortest route between two points in the map. The response time is very less; by just dragging the points in the map one can find the shortest path. This also gives the user i.e. tourist, the direction of path from the current location to the destination. This page also allows the user to navigate between different pages.

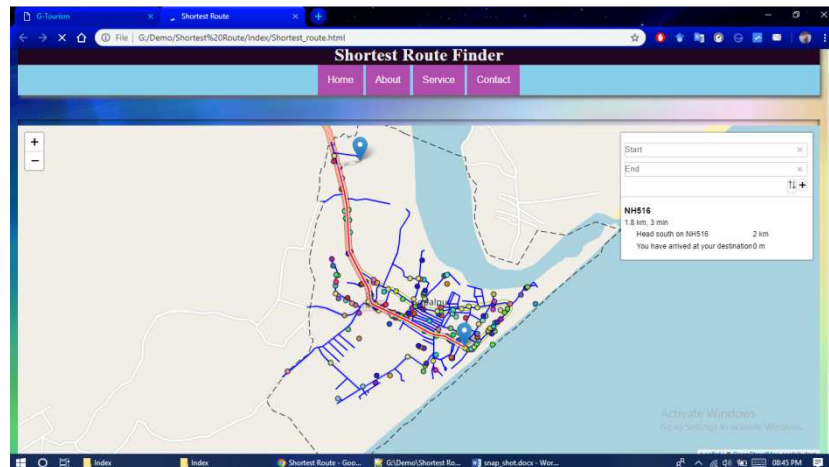


Figure 5: Shortest Route Finder

Live Weather

This page is designed to allow the user to get the current and upcoming seven days weather forecast. The weather data is fetched from weather forecast. This page is accurate and dynamic, because real time weather is updated in the website every time. The user can also get a graph of maximum and minimum temperature of last ten years for Gopalpur on sea.

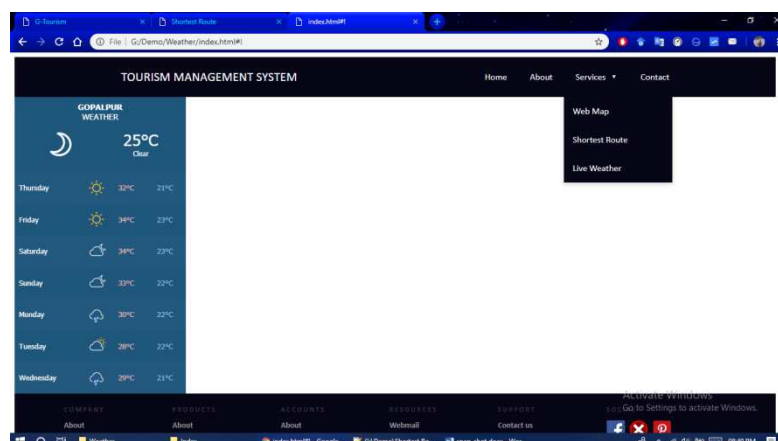


Figure 6: Weather Information in the Portal

Emergency Contact

This page developed with HTML and CSS, brings all the important contact details to the user in a tabular format. These contact details like Police, ambulance etc. have been accessed from www.ori.gov.in. This page also allows the user to navigate to another page from the menu bar.

CONCLUSIONS

The web GIS portal developed is a showcase to highlight the use of free and open source soft wares in these types of exercises, reducing cost and time. This type of Web based GIS portal will be of immense use to tourists and tourism management authorities providing spatial information as well as collated data of the tourist site. Initiatives also can be taken to develop such tourism management system based on free and open source softwares for tourist sites under projects like Integrated Development of Theme Based Tourist Circuits (Swadesh Darshan) & National Mission on Pilgrimage

Rejuvenation and Spiritual, Heritage Augmentation Drive(PRASHAD) in India, without huge investments of hardwares and commercial softwares.

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